"DIMITRIE BOLINTINEANU" TECHNOLOGICAL HIGH SCHOOL

PHYSICS DEPARTMENT

AUXILIARY MATERIAL FOR PHYSICS STUDY SUBJECT

Teachers: Enache Mihaela and Enache Onisei

LESSON PLAN

TEACHER: ENACHE MIHAELA

GRADE: 10th

SUBJECT: Physics

DATE:

LESSON TITLE: Thermal engines with internal combustion

LESSON TYPE: Assimilating new knowledge

SPECIFIC COMPETENCIES

- *IDENTIFYING PARTS OF THERMAL ENGINES AND EXPLAINING HOW THEY WORK;*
- *DESCRIBING MAIN THERMODYNAMIC CYCLES – OTTO, DIESEL – WHICH CONSTITUTE THE OPERATIONAL BASIS OF THERMAL ENGINES*

METHODS USED

brainstorming	problematizarea	sinectica
modelarea	Explanation	Scheduled training
Demonstration	Euristic conversation	exercise

TEACHING MEANS:

Information-demonstration material
Material for forming and practicing skills
Blended teaching material and means (course book, courses, workbooks, scientific papers)

ACTIVITY ORGANIZATION FORMS

- independent activities
- team activities
- front activities

RESOURCES

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- OFFICIAL: school curriculum
- TIME: 50 min
- OTHER: Educational software, specialized books

LESSON PLAN (RUNNING THE LESSON)

1. Organizing stage:

- checking attendance

-materials needed for the class (computers, educational software, video-projector, thermal engines models)

2. Updating previous knowledge:

- What is a thermal engine?
- Types of thermal engines?

3. Presenting the topic and aims of the lesson:

4. Running the learning activities

Teaching scope	Teaching strategy	**Time**	**Learning strategies**			**Resources**
			Students with visual dominant	**Students with audio dominant**	**Students with practical dominant**	
Providing information on thermal engines with internal combustion c	Organizational stage Brainstorming- "What is a thermal engine?" Presentation of how thermal engines with internal combustion are built (Otto and Diesel)	5 min 10min	- Sketch drawing of the structure of a thermal engine, mentioning operational time and following teacher's presentation	-listening to the teacher's presentation; - students ask questions during presentation breaks;	-students identify the parts of a thermal engine	Informative material on film support on the topic of thermal engines

Explaining the theoretical concepts.	Creating models of engine building (comparative analysis)	10min	- students make the associations in their worksheets	- students fill out the blanks in the worksheets as the multimedia presentation runs on the screen	- students complete their worksheets	Models of thermal engines Worksheets differentiated according to learning style
Workshop	Simulating the operation of an engine The teacher monitors students' activity Building the engine operational cycle (Otto, Diesel)	15 min	- students use the simulation controls based on the instructions included in the worksheet - students draw the shape of the operational cycle following the description in the software	- students apply the simulation controls based on the teacher's instructions - students draw the shape of the cycle based on the description of the operation time made by members of the group	- students apply the simulation controls on the front panel of the software - students draw the shape of the cycle identifying the operational time and the transformation type	Own computer network; Educational software – LABVIEW Worksheet to be completed by working in teams

Consolidating knowledge **Assessment**	Completing the lesson assessment sheet	5min 3 min	- students address questions to their classmates who are audio dominant about difficulties encountered	- students answer questions addressed by the other classmates and/or resort to the teacher's assistance	- aspects not fully understood by the other students are clarified	
Homework		2 min	Explaining homework			

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WORKSHEET FOR THE *VISUAL*

1. Draw the schematic structure of the Otto engine and Diesel engine using the presented models as a starting point

2.Point out the differences between the two graphics.



WORKSHEET FOR THE *AUDIO*

1.Fill out the lines with the names of the parts of the Otto and Diesel engines using the engine models presented.

2. Fill out the blanks taking into consideration the models that were presented:

The Otto engine

a) Fuel……
……
b) Ignition system.....
c) Operating time.....
…….....

The Diesel engine

d) Fuel……
……
e) Ignition system.....
f) Operating time.....
…….....



WORKSHEET FOR THE *PRACTICAL*

1. Draw the schematic structure of the Otto engine and the Diesel engine, using the presented models as a starting point.

2.Identify the operation time and the similarities and differences between the two engines using the thermal engine models.

TEAM WORKSHEET

I. FOLLOWING THE INSTRUCTIONS IN THE WORKSHEET, SIMULATE THE OPERATION OF THE OTTO ENGINE AND THE DIESEL ENGINE

1. OPEN THE THERMAL ENGINE APPLICATION (LABVIEW SOFTWARE)
2. RUN THE APPLICATION
3. SELECT THE TYPE OF ENGINE AND PRESS ***„START”***
4. FOLLOW THE SIMULATION OF THE ENGINE OPERATION AND OPERATION CYCLE

II. DRAW THE SHAPE OF THE OPERATION CYCLE IDENTIFYING THE TRANSFORMATIONS THAT MAKE UP THE CYCLE

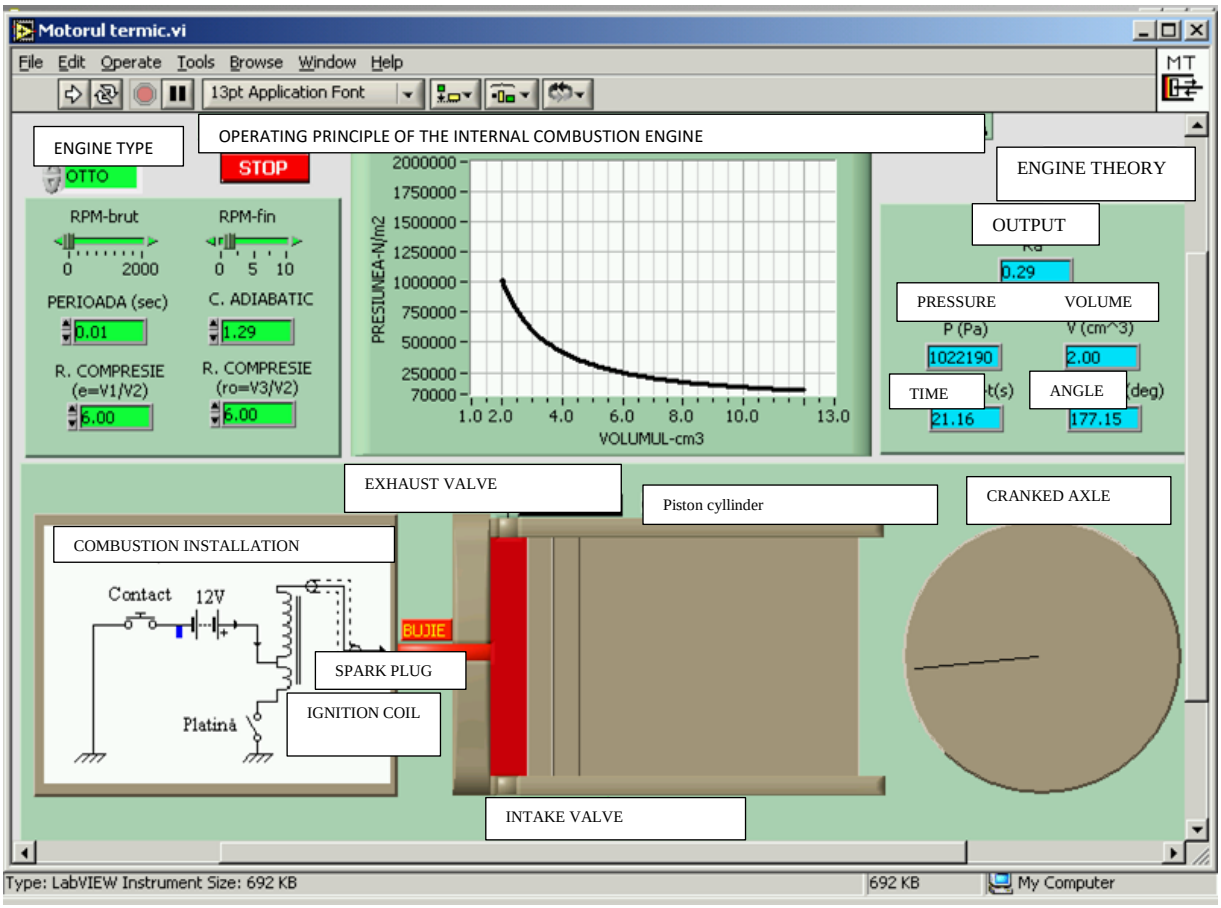
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THE OTTO ENGINE



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